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G70-C GENERAL PERMIT ENGINEERING EVALUATION

PREVENTION AND CONTROL OF AIR POLLUTION IN REGARD TO THE CONSTRUCTION, MODIFICATION, RELOCATION, ADMINISTRATIVE UPDATE AND OPERATION OF NATURAL GAS PRODUCTION FACILITIES LOCATED AT THE WELL SITE

APPLICATION NO.: G70-C**222**	FACILITY ID: **095-00073**

☒ CONSTRUCTION
☐ MODIFICATION
☐ RELOCATION
☐ CLASS I ADMINISTRATIVE UPDATE
☐ CLASS II ADMINISTRATIVE UPDATE

BACKGROUND INFORMATION

Name of Applicant (as registered with the WV Secretary of State's Office): Antero Resources Corporation

Federal Employer ID No. (FEIN): 80-0162034

Applicant's Mailing Address: 1615 Wynkoop Street

City: Denver	State: CO	ZIP Code: 80202

Facility Name: Vera Wellpad

Operating Site Physical Address: 860 Grimms Run Rd.
If none available, list road, city or town and zip of facility.

City: Middlebourne	Zip Code: 26149	County: Tyler

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Latitude: 39.42539
Longitude: -80.90412

SIC Code: 1311 NAICS Code: 211111	Date Application Received: September 8, 2016
Fee Amount: $1,500	Date Fee Received: September 12, 2016
Applicant Ad Date: September 21, 2016	Newspaper: *Tyler Star News*
Date Application Complete: January 17, 2017	Due Date of Final Action: March 3, 2017

Engineer Assigned: David Keatley

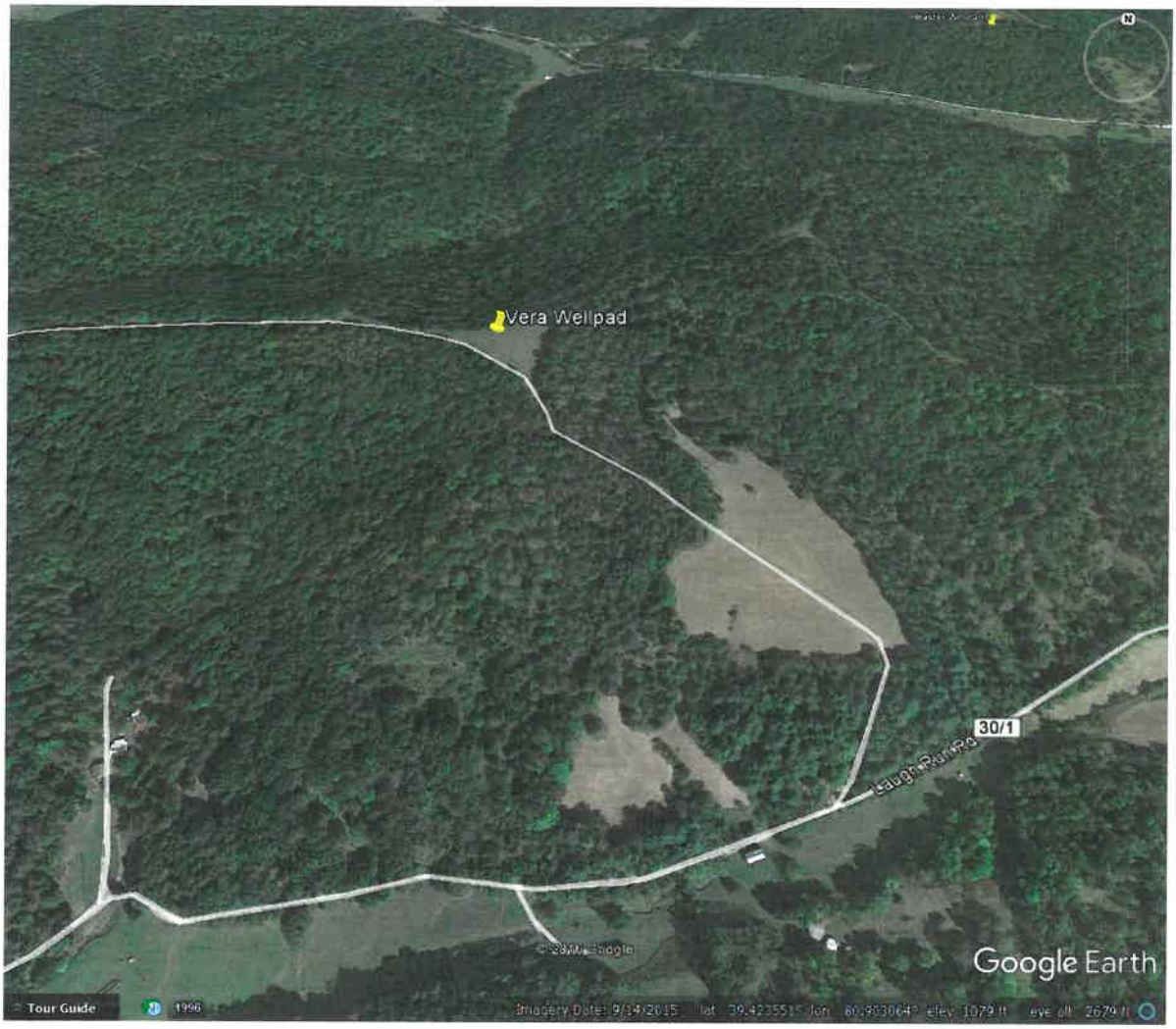
Description of Permitting Action: Installation and operation of: fourteen (14) 1.5-mmBtu/hr GPU heaters, fourteen (14) 2.0-mmBtu/hr line heaters, ten (10) 400-bbl condensate tanks, four (4) 400-bbl produced water tanks, three (3) 12-mmBtu/hr enclosed combustors, two (2)110-bhp engines, and four (4) 76-bhp engines.

PROCESS DESCRIPTION

This is a natural gas and condensate production facility. Raw natural gas from fourteen (14) natural gas wells goes to fourteen (14) 2.0-mmBtu/hr line heaters (LH001 through LH014). The line heaters heat the natural gas to help prevent freezing and promote phase separation. The natural gas then goes to fourteen (14) gas production unit (GPU) burners (GPU001 through GPU-014) which further heats the natural gas to encourage phase separation. The gas from the GPU exit the facility via pipeline. The produced water goes to four (4) 400-bbl produced water tanks (TANKPW-001 through TANKPW004). The condensate from the GPUs goes to low-pressure separators. The gas from the low-pressure separators goes to high-pressure VRU compressors where the gas is compressed and exit the facility via pipeline. The VRU compressors are powered by four (4) four-stroke rich-burn 76-bhp Ford MSG-425 (ENG001 through ENG004) natural gas fired engines. The condensate from the low-pressure separators are sent to vapor recovery towers. The gas from the vapor recovery towers go to low-pressure VRU compressors where the gas is compressed and then go to the high-pressure VRU compressors. The high-pressure VRU compressors are powered by two (2) four-stroke rich-burn 110-bhp Ford CSG-637 (ENG005 and ENG006) natural gas fired VRU compressor engines. The condensate from the vapors recovery towers goes to ten (10) 400-bbl condensate tanks (TANKCOND001 through TANKCOND010). The working, breathing, and flash vapors from the condensate and produced water is controlled by three (3) 12-mmBtu/hr enclosed combustors (EC001 through EC003). The liquids from the condensate tanks will be loaded into trucks at a maximum rate of 20,695,500 gallons/year (L001) and taken off site. The liquids from the produced water tanks will be loaded into trucks at a maximum rate of 7,358,400 gallons/year (L002) and taken off site.

SITE INSPECTION

Site Inspection Date: November 2, 2016
Site Inspection Conducted By: James Robertson
Results of Site Inspection: The pad is located in a relatively remote location on top of a hill.
Did Applicant meet Siting Requirements? Yes
If applicable, was siting criteria waiver submitted? Not Applicable (NA)
Directions to Facility: From Middlebourne, travel southwest on WV 18 toward Bridgeway Rd. for approximately 0.2 miles. Turn right onto Bridgeway Rd. and travel for approximately 0.1 miles. Turn Turn left onto Middlebourne-Wick Rd. (CR 7) for approximately 6.1 miles. Turn left onto Bearsville Rd. (CR 30) for approximately 1.2 miles. Turn left onto Laugh Run Rd. (CR 30/1) and travel for approximately 1.3 miles. Turn left onto the access road for the facility and travel approximately 0.4 miles and the facility is on the left.
Overhead Google Earth Image of Facility:



ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

The following table indicates which methodology was used in the emissions determination:

Emission Unit ID#	Process Equipment	Calculation Methodology (e.g. ProMax, GlyCalc, mfg. data, AP-42, etc.)
GPU001 through GPU0014	Gas Production Unit Heaters	AP-42
LH001 through LH014	Line Heaters	AP-42
TANKCOND001 through TANKCOND010	Condensate Tanks	Promax using liquid sample and gas sample from Weigle East Wellpad
TANKPW001 through TANKPW004	Produced Water Tanks	Promax using liquid sample and gas sample from Weigle East Wellpad
L001	Condensate Truck Loading	EPA AP-42 Chapter 5 equation (submerged loading and dedicated service)
L002	Produced Water Tanks	EPA AP-42 Chapter 5 equation (submerged loading and dedicated service)
EC001 through EC003	Enclosed Combustors	EPA AP-42
ENG001 through ENG004	VRU Compressor Engines	Manufacturer Date and EPA AP-42 emission factors
ENG005 through ENG006	VRU Compressor Engines	Manufacturer Date and EPA AP-42 emission factors

The total facility PTE for the facility (including fugitive emissions) is shown in the following table:

Pollutant	Facility Wide PTE (tons/year)
Nitrogen Oxides	29.77
Carbon Monoxide	75.89
Volatile Organic Compounds	61.17
Particulate Matter	1.55
Particulate Matter-10/2.5	1.55
Sulfur Dioxide	0.12
Formaldehyde	0.40
Total HAPs	1.69
Benzene	0.04
Toluene	0.02
Xylenes	0.01
n-Hexane	1.22
Carbon Dioxide Equivalent	25,244

Emission Point ID	Emission Unit ID	Emission Source	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
EP-EC001 through EP-EC003	TANKCOND001 TANKCOND002, TANKPW001, TANKPW002, and EC001 through EC003	Cimarron 48" Enclosed Combustors (Controlling: Produced Water Tanks and Condensate Tanks) Emissions per Each	Nitrogen Oxides	0.82	3.58
			Carbon Monoxide	3.72	16.30
			Volatile Organic Compounds	0.08	3.49
			n-Hexane	0.07	0.30
			CO_2e	173	758
EP-GPU001 through EP-GPU014	EU-GPU001 through EU-GPU014	Gas Production Unit Burners 1.5 mmBtu/hr	Nitrogen Oxides	0.12	0.53
			Carbon Monoxide	0.11	0.45
			Volatile Organic Compounds	0.01	0.03
			Total Particulate Matter	0.01	0.04
			CO_2e	145	636
EP-LH001 through EP-LH007	EU-LH001 through EU-LH007	Line Heaters 2.0 mmBtu/hr	Nitrogen Oxides	0.16	0.71
			Carbon Monoxide	0.14	0.59
			Volatile Organic Compounds	0.01	0.04
			Total Particulate Matter	0.02	0.06
			CO_2e	194	848
EP-ENG001 through EP-ENG004	ENG001 through ENG004	High-Pressure VRU Compressor Engine Ford MSG-425 76 bhp	Nitrogen Oxides	0.07	0.28
			Carbon Monoxide	0.42	1.81
			Volatile Organic Compounds	0.02	0.09
			Total Particulate Matter	0.01	0.03
			CO_2e	78	340
			Nitrogen Oxides	0.08	0.32

EP-ENG005 and EP-ENG006	EU-ENG005 and EU-ENG006	Low-Pressure VRU Compressor Engine Ford CSG-637 110 bhp	Carbon Monoxide	0.60	2.62
			Volatile Organic Compounds	0.03	0.12
			Total Particulate Matter	0.01	0.04
			CO_2e	105	456
EP-L001	L001	Condensate Truck Loading 20,695,500 gallons/year	Volatile Organic Compounds	47.92	49.20
			Hexane	0.35	0.35
			Xylenes	0.01	0.01
			CO_2e	6	6
EP-L002	L002	Produced Water Truck Loading 7,358, 400 gallons/year	Volatile Organic Compounds	<0.01	<0.01
			CO_2e	<0.01	<0.01

REGULATORY APPLICABILITY

45CSR2 (Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers)

The purpose of 45CSR2 (Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers) is to establish emission limitations for smoke and particulate matter which are discharged from fuel burning units.

45CSR2 states that any fuel burning unit that has a heat input under ten (10) MMBTU/hr is exempt from Sections 4 (weight emission standard), 5 (control of fugitive particulate matter), 6 (registration), 8 (testing, monitoring, recordkeeping, reporting) and 9 (startups, shutdowns, malfunctions). However, failure to attain acceptable air quality in parts of some urban areas may require the mandatory control of these sources at a later date. If the individual heat input of all of the proposed fuel burning units are below 10 MMBTU/hr, these units are exempt from the aforementioned sections of 45CSR2. However, the registrant would be subject to the opacity requirements in 45CSR2, which is 10% opacity based on a six minute block average. Fuel burning units greater than 10 MMBTU/hr are ineligible for registration under General Permit G70-C

Emission Unit ID#	Emission Unit Description	Maximum Design Heat Input (MDHI) (MMBTU/hr)
GPU001 through GPU0014	Gas Production Unit Heaters	1.5
LH001 through LH014	Line Heaters	2.0

45CSR6 (To Prevent and Control Air Pollution from the Combustion of Refuse)

45CSR6 prohibits open burning, establishes emission limitations for particulate matter, and establishes opacity requirements. Sources subject to 45CSR6 include completion combustion devices, enclosed combustion devices, and flares.

The facility-wide requirements of the general permit include the open burning limitations §§45-6-3.1 and 3.2.

All completion combustion devices, enclosed combustion devices, and flares are subject to the particulate matter weight emission standard set forth in §45-6-4.1; the opacity requirements in §§45-6-4-3 and 4-4; the visible emission standard in §45-6-4.5; the odor standard in §45-6-4.6; and, the testing standard in §§45-6-7.1 and 7.2.

Enclosed combustion control devices and flares that are used to comply with emission standards of NSPS, Subpart OOOO are subject to design, operational, performance, recordkeeping and reporting requirements of the NSPS regulation that meet or exceed the requirements of 45CSR6.

Emission Unit ID#	Maximum Design Heat Input (MDHI) (MMBTU/hr)	Subject to Weight Emission Standard?	Control Efficiency Claimed by Registrant	Provide Justification how 45CSR6 is met.
EC001 through EC003	12 (each)	☒ Yes ☐ No	98%	The estimated total particulate matter emissions are less than the allowable emission limits.

45CSR10 (To Prevent and Control Air Pollution from the Emission of Sulfur Oxides)

45CSR10 establishes emission limitations for SO_2 emissions which are discharged from stacks of fuel burning units. A "fuel burning unit" means and includes any furnace, boiler apparatus, device, mechanism, stack or structure used in the process of burning fuel or other combustible material for the primary purpose of producing heat or power by indirect heat transfer. Sources that meet the definition of "Fuel Burning Units" per 45CSR10-2.8 include GPUs, in-line heaters, heater treaters, and glycol dehydration unit reboilers.

Fuel burning units less than 10 MMBtu/hr are exempt. The sulfur dioxide emission standard set forth in 45CSR10 is generally less stringent than the potential emissions from a fuel burning unit for natural gas. The SO_2 emissions from a fuel burning unit will be listed in the G70-C permit registration at the discretion of the permit engineer on a case-by-case basis. Issues such as non-attainment designation, fuel use, and amount of sulfur dioxide emissions will be factors used in this determination. Fuel burning units greater than 10 MMBTU/hr are ineligible for registration under General Permit G70-C

Fuel burning units burning natural gas are exempt from Section 8 (Monitoring, Recording and Reporting) as well as interpretive rule 10A. The G70-C eligibility requirements exclude from eligibility any fuel burning unit that does not use natural gas as the fuel; therefore, there are no permit conditions for 45CSR10.

Emission Unit ID#	Emission Unit Description	Maximum Design Heat Input (MDHI) (MMBTU/hr)
GPU001 through GPU0014	Gas Production Unit Heaters	1.5
LH001 through LH014	Line Heaters	2.0

45CSR13 (Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation)

45CSR13 applies to this source due to the fact that the applicant is defined as a "stationary source" under 45CSR13 Section 2.24.b. *Stationary source* means, for the purpose of this rule, any building, structure, facility, installation, or emission unit or combination thereof, excluding any emission unit which meets or falls below the criteria delineated in Table 45-13B which: (a) is subject to any substantive requirement of an emission control rule promulgated by the Secretary; (b) discharges or has the potential to discharge more than six (6) pounds per hour and ten (10) tons per year, or has the potential to discharge more than 144 pounds per calendar day, of any regulated air pollutant; (c) discharges or has the potential to discharge more than two (2) pounds per hour or five (5) tons per year of hazardous air pollutants considered on an aggregated basis; (d) discharges or has the potential to discharge any air pollutant(s) listed in Table 45-13A in the amounts shown in Table 45-13A or greater; or, (e) an owner or operator voluntarily chooses to be subject to a construction or modification permit pursuant to this rule, even though not otherwise required to do so. 45CSR13 has an original effective date of June 1, 1974.

The applicant meets the definition of a stationary source because (check all that apply):

- ☐ Subject to a substantive requirement of an emission control rule promulgated by the Secretary.
- ☒ Discharges or has the potential to discharge more than six (6) pounds per hour and ten (10) tons per year, or has the potential to discharge more than 144 pounds per calendar day, of any regulated air pollutant.
- ☐ Discharges or has the potential to discharge more than two (2) pounds per hour or five (5) tons per year of hazardous air pollutants considered on an aggregated basis.
- ☐ Discharges or has the potential to discharge any air pollutant(s) listed in Table 45-13A in the amounts shown in Table 45-13A or greater.
- ☐ Voluntarily chooses to be subject to a construction or modification permit pursuant to this rule, even though not otherwise required to do so.

General Permit G70-C Registration satisfies the construction, modification, relocation and operating permit requirements of 45CSR13. General Permit G70-C sets forth reasonable conditions that enable eligible registrants to establish enforceable permit limits.

Section 5 of 45CSR13 provides the permit application and reporting requirements for construction of and modifications to stationary sources. No person shall cause, suffer, allow or permit the construction, modification, relocation and operation of any stationary source to be commenced without notifying the Secretary of such intent and obtaining a permit to construct, modify, relocate and operate the stationary source as required in the rule or any other applicable rule promulgated by the Secretary.

If applicable, the applicant meets the following (check all that apply):

☒ Construction
☐ Modification
☐ Class I Administrative Update (45CSR13 Section 4.2.a)
☐ Class II Administrative Update (45CSR13 Section 4.2.b)

45CSR16 (Standards of Performance for New Stationary Sources Pursuant to 40 CFR Part 60)

45CSR16 applies to all registrants that are subject to any of the NSPS requirements described in more detail in the Federal Regulations section. Applicable requirements of NSPS, Subparts IIII, JJJJ and OOOO are included in General Permit G70-C.

The applicant is subject to:
☐ 40CFR60 Subpart IIII
☒ 40CFR60 Subpart JJJJ
☒ 40CFR60 Subpart OOOO

45CSR22 (Air Quality Management Fee Program)

45CSR22 is the program to collect fees for certificates to operate and for permits to construct or modify sources of air pollution. 45CSR22 applies to all registrants. The general permit fee of $500 is defined in 45CSR13. In addition to the application fee, all applicants subject to NSPS requirements or NESHAP requirements shall pay additional fees of $1,000 and $2,500, respectively.

Registrants are also required to obtain and have in effect a valid certificate to operate in accordance with 45CSR22 §4.1. The fee group for General Permit G70-C is 9M (all other sources) with an annual operating fee of $200.

40CFR60 Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines)

Subpart JJJJ sets forth nitrogen oxides (NOx), carbon monoxide (CO), and volatile organic compound (VOC) emission limits, fuel requirements, installation requirements, and monitoring requirements based on the year of installation of the subject internal combustion engine. The provisions for stationary spark ignition (SI) internal combustion engines for owners or operators of this Subpart have been included in General Permit G70-C, Section 13.

Emission Unit ID#	Engine Description (Make, Model)	Engine Size (HP)	Date of Manufacture	Provide Justification how 40CFR60 Subpart JJJJ is met.
ENG001 through ENG004	Ford MSG-425	76	2015	☐ Met Emission Standard ☒ Certified Engine
ENG005 through ENG006	Ford CSG-637	110	2015	☐ Met Emission Standard ☒ Certified Engine

40CFR60, Subpart OOOO (Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution)

EPA published its New Source Performance Standards (NSPS) and air toxics rules for the oil and gas sector on August 16, 2012. EPA published final amendments to the Subpart on September 23, 2013.

40CFR60 Subpart OOOO establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide (SO_2) emissions from affected facilities that commence construction, modification or reconstruction after August 23, 2011. The affected sources which commence construction, modification or reconstruction after August 23, 2011 are subject to the applicable provisions of this Subpart as described below:

Gas well affected facilities are included in General Permit G70-C in Section 5.0.

Are there any applicable gas well affected facilities? ☒ Yes ☐ No

If Yes, list.

API number(s) for each Gas Well at this facility	Date the Gas Well was drilled or re-fractured
47-095-02356-00	May 1, 2017
Six Wells	Proposed Date 5/1/2017
Seven Wells	Proposed Date March 1, 2018

Centrifugal compressor affected facilities are included in General Permit G70-C, Section 11.0.

Are there any applicable centrifugal compressor affected facilities not located at the well site?

☐ Yes ☒ No

Each centrifugal compressor affected facility, which is a single centrifugal compressor using wet seals that is located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment. A centrifugal compressor located at a well site, or an adjacent well site and servicing more than one well site, is not an affected facility under this Subpart.

Reciprocating compressor affected facilities are included in General Permit G70-C, Section 12.0.

Are there any applicable reciprocating compressor affected facilities not located at the well site?

☐ Yes ☒ No

Each reciprocating compressor affected facility, which is a single reciprocating compressor located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment. A reciprocating compressor located at a well site, or an adjacent well site and servicing more than one well site, is not an affected facility under this subpart.

Pneumatic controllers affected facilities are included in General Permit G70-C, Section 10.0.

Are there any applicable pneumatic controller affected facilities? ☐Yes ☒No

For the natural gas production segment (between the wellhead and the point of custody transfer to the natural gas transmission and storage segment and not including natural gas processing plants), each pneumatic controller affected facility, which is a single continuous bleed natural gas-driven pneumatic controller operating at a natural gas bleed rate greater than 6 scfh.

Requirements for storage vessel affected facilities are included in General Permit G70-C, Section 7.0. Determination of storage vessel affected facility status is included in Section 6.0 of General Permit G70-C.

Are there any applicable storage vessel affected facilities? ☐Yes ☒No

If No, list any emission reduction devices and control efficiencies used to avoid 40CFR60 Subpart OOOO.

The enclosed vapor combustors (EC001 through EC002) will be used to achieve a minimum control efficiency of 98%

Each storage vessel affected facility, which is a single storage vessel located in the oil and natural gas production segment, natural gas processing segment or natural gas transmission and storage segment, and has the potential for VOC emissions equal to or greater than 6 tpy as determined according to this section by October 15, 2013 for Group 1 storage vessels and by April 15, 2014, or 30 days after startup (whichever is later) for Group 2 storage vessels. A storage vessel affected facility that subsequently has its potential for VOC emissions decrease to less than 6 tpy shall remain an affected facility under this subpart.

40CFR63 Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines)

Subpart ZZZZ establishes national emission limitations and operating limitations for hazardous air pollutants (HAP) emitted from stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions. This Subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and operating limitations. This section reflects EPA's final amendments to 40 CFR part 63, Subpart ZZZZ that were issued on January 15, 2013 and published in the Federal Register on January 30, 2013.

WVDEP DAQ has delegation of the area source air toxics provisions of this Subpart requiring Generally Achievable Control Technology (GACT). The provisions of this Subpart have been included in this general permit under Section 13.0.

Emission Unit ID#	Engine Description (Make, Model)	Engine Size (HP)	Date of Manufacture	New or Existing under 40CFR63 Subpart ZZZZ?	Provide Justification how 40CFR63 Subpart ZZZZ is met.
ENG001 through ENG004	Ford MSG-425	76	2015	New	40CFR63 Subpart ZZZZ is met by meeting the requirements of 40CFR60 Subpart JJJJ
ENG005 through ENG006	Ford CSG-637	110	2015	New	40CFR63 Subpart ZZZZ is met by meeting the requirements of 40CFR60 Subpart JJJJ

Are there any engines that fall in the window of being new under 40CFR60 Subpart ZZZZ but manufactured before the applicability date in 40CFR60 Subpart JJJJ? ☐Yes ☒No

SOURCE AGGREGATION DETERMINATION

"Building, structure, facility, or installation" is defined as all the pollutant emitting activities which belong to the same industrial grouping, are located on one or more contiguous and adjacent properties, and are under the control of the same person.

Are there surrounding wells or compressor stations under "common control" of the applicant?
☐ Yes ☒ No

Are the properties in question located on "contiguous or adjacent" properties?
☐ Yes ☒ No

Are there surrounding facilities that share the same two (2) digit SIC code?
☐ Yes ☒ No

Final Source Aggregation Decision.
☒ Source not aggregated with any other source.
☐ Source aggregated with another source. List Company/Facility Name:

RECOMMENDATION TO DIRECTOR

The information provided in the permit application, including all supplemental information received, indicates the applicant meets all the requirements of applicable regulations and the applicant has shown they meet the eligibility requirements of General Permit G70-C. Therefore, impact on the surrounding area should be minimized and it is recommended that the facility should be granted registration under General Permit G70-C.

Permit Engineer Signature: David Keatley
Name and Title: David Keatley - NSR Permitting
Date: January 31, 2017